EFFECTS OF ACU-TENS, INTERFERENTIALTHERAPY AND EXERCISES ON THE QUALITY OF LIFE IN WOMEN WITH MIXED URINARY INCONTINENCE –AN EXPERIMENTAL STUDY

Dissertation submitted to

The Tamil Nadu Dr. M.G.R. Medical University

Chennai

In partial fulfillment of the requirements for the degree of

MASTER OF PHYSIOTHERAPY

(OBSTETRICS AND GYNAECOLOGY)

Reg.No.271560001

APRIL – 2017

COLLEGE OF PHYSIOTHERAPY

SRI RAMAKRISHNA INSTITUTE OF PARAMEDICAL SCIENCES

COIMBATORE – 641044

CERTIFICATE

This is to certify that the dissertation work entitled "**Effects of Acu-TENS, Interferential therapy and exercises on the quality of life in women with mixed urinary incontinence**" – **An Experimental Study** was carried out by the candidate bearing the **Register No.271560001 (April 2017)** in College of Physiotherapy, SRIPMS, Coimbatore, affiliated to the Tamil Nadu Dr. M.G.R Medical University, Chennai towards partial fulfillment of the **Master of Physiotherapy (Obstetrics and Gynaecology).**

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CERTIFICATE

This is to certify that the dissertation work entitled "**Effects of Acu-TENS, Interferential therapy and exercises on the quality of life in women with mixed urinary incontinence**"-**An Experimental Study** was carried out by the candidate bearing the **Register No.271560001 (April 2017)**in College of Physiotherapy, SRIPMS, Coimbatore, affiliated to the Tamil Nadu Dr. M.G.R Medical University, Chennai towards partial fulfillment of the **Master of Physiotherapy (Obstetrics and Gynaecology)** under my direct supervision and guidance.

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CERTIFICATE

This is to certify that the dissertation work entitled **"Effects of Acu-TENS, Interferential therapy and exercises on the quality of life in women with mixed urinary incontinence"– An experimental study.**

Submitted By

Reg.No.271560001

APRIL-2017

To The Tamil Nadu Dr. M.G.R Medical University, Chennai in partial fulfillment of the requirement for the award of degree of **MASTER OF PHYSIOTHERAPY** was evaluated.

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

Place: Coimbatore
Date:

Acknowledgment

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Abbreviations

ABBREVIATIONS

UI	-	Urinary Incontinence
SUI	-	Stress Urinary Incontinence
UUI	-	Urge Urinary Incontinence
MUI	-	Mixed Urinary Incontinence
IUA	-	International Urogynecological Association
IUS	-	International Continence Society
IFT	-	Interferential Therapy
TENS	-	Transcutaneous Electrical Nerve Stimulation
Acu	-	Acupressure points, Acupuncture points, Acupoints
Acu-TENS	-	Transcutaneous Electrical Nerve Stimulation on Acupoints
PFM	-	Pelvic Floor Muscle
PFMT	-	Pelvic Floor Muscle Training
OAB	-	Over Active Bladder
FSUI	-	Female Stress Urinary Incontinence
GSI	-	Genuine Stress Incontinence
QOL/QoL	-	Quality Of Life
KHQ	-	Kings Health Questionnaire/ Kings Health Quality Of Life Questionnaire

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Introduction

1. INTRODUCTION

Urinary incontinence is a common problem with widespread human and social implication causing discomfort, shame and loss of self- confidence. It not only affects the quality of life but also has significant cost complications. Urinary incontinence (UI) commonly classified as the stress urinary incontinence (SUI), if there is any involuntary loss of urine when coughing or sneezing; urge urinary incontinence (UUI), if there is an abrupt and sudden urge to urinate that cannot be postponed and mixed urinary incontinence (MUI) if it is associated with both situation mentioned above.

The International Urogynecological Association (IUA) and International Continence Society (ICS) defined mixed urinary incontinence as “the complaints of involuntary loss of urine associated with urgency and also with the effort or physical exertion or on sneezing and coughing”.

Mixed urinary incontinence has been described urodynamically as “representing both urodynamic stress incontinence and detrusor over activity with or without incontinence”.

Many people have symptoms of both stress incontinence and urge incontinence because; mixed urinary incontinence is the combination of both stress urinary incontinence and urge urinary incontinence. Also mixed urinary incontinence share the causes of both stress urinary incontinence and urge urinary incontinence.

Stress urinary incontinence is commonly seen in pregnancy, after vaginal birth, sneezing, coughing or other factors leads to weakness of muscles that support and control the bladder or increase pressure on the bladder causing urine to leak.

Urge incontinence is caused by involuntary action of the bladder muscles. These may occur because of damage to nerves of the bladder, the nervous system or muscle themselves. Such damage may be caused by certain surgeries or diseases such as multiple sclerosis, parkinson's disease, diabetes, stroke or injury.

The study of prevalence of urinary incontinence (2013) in Indian women shows that among the total women having incontinence, highest number were found in stress urinary incontinence (60.8%) followed by mixed urinary incontinence (26.8 %) and urge incontinence (12.4 %).

It was seen that prevalence was low in women up to 30 years of age. In women above 30 years of age, the prevalence ranged from 27.8 % to 42.8 % with maximum prevalence in the age group between 40 to 55 years of age.

The prevalence of all type of urinary incontinence was significantly higher in postmenopausal women and women who had hysterectomy. The prevalence of incontinence is maximum among group with the vaginal delivery (26.84 %) followed by women with BMI > 25 (20%), caesarian delivery (10.12%) [This is possible explanation of damage of bladder, either neurologically, muscularly or mechanically during dissection]. More women with mixed urinary incontinence used locally applied estrogen than in stress urinary incontinent women. The women with mixed urinary incontinence more often suffered from chronic constipation than stress urinary incontinence. The frequency of cases with history of radiation because of gynecological cancers was higher in women with mixed urinary incontinence, but the actual numbers were small.

Epidemiological studies show that women with mixed urinary incontinence symptom typically have worse incontinence than do women with stress urinary incontinence and urge urinary

incontinence. Treatment for mixed urinary incontinence will require a combination approaches used to relieve both stress urinary incontinence and urge urinary incontinence. The condition often poorly response when treated using either pharmacological or surgical approach.

The practice of the conservative management of mixed urinary incontinence is wide spread and should be encouraged. All modalities appear to be more effective than no therapy. Unlike surgical treatment of urinary incontinence, which carries a significant risk of complication and poor long term outcomes, conservative management is associated with minimal adverse outcome. It includes different modalities and different exercises. Acupuncture, electrical stimulation, Interferential therapy, Acu- TENS, vaginal cones, pelvic floor exercise, abdominal exercises, breathing exercises, bladder training etc. For a significant number of patients, conservative managements are satisfactory as it obviates the need for medical or surgical interventions.

1.1 NEED FOR THE STUDY

Mixed urinary incontinence has a serious impact on the quality of life of patients. It can also cause anxiety and depression; it influences patient's social interactions and sexual function. The conservative management options are usually advocated as an initial intervention since it carries minimal risk than pharmacological and surgical managements. There are limited studies available on the effects of combination using Acu-TENS, Interferential therapy and exercises for the management of mixed urinary incontinence. Hence, this study was designed.

1.2 OBJECTIVE

To determine the effects of Acu-TENS, Interferential therapy and exercises on quality of life in women with mixed urinary incontinence

1.3 HYPOTHESIS

Null Hypothesis

There is no significant difference on quality of life while using Acu-TENS, Interferential therapy and exercises in women with mixed urinary incontinence.

Alternative Hypothesis

There is significant difference on quality of life while using Acu-TENS, Interferential therapy and exercises in women with mixed urinary incontinence.

Review of Literature

2. REVIEW OF LITERATURE

- **Chen Yet al., (2016)** concluded that electro acupuncture improves the quality of life effectively in Mixed Urinary Incontinence patients and the clinical efficacy is apparent.
- **Liu Yet al., (2016)** concluded that 20 Hz TENS improved urinary incontinence symptoms and promoted activities of daily living better than 75-Hz TENS. These results will aid future research regarding TENS parameters.
- **Nidhi Sharma et al., (2016)** found that many OAB patients have been successfully treated with TENS. TENS is a portable, non-addictive, non-invasive means of bladder control with flexible patient directed dosing. Small electrical pulses delivered via electrodes directly placed on skin reduce detrusor hyper-reflexia through both central and peripheral mechanisms. High stimulus just below strong but comfortable intensity with alternating high and low frequency current produces maximal effect.
- **Amanda Carolina et al., (2015)** suggested that the transcutaneous electrical nerve stimulation performed in two weekly sessions proved to be effective in the total regression of symptoms of urinary urge incontinence.

- **Dulcegleika vb sartori et al., (2015)** found that age does not affect PFM strength in incontinent women. There is a good relationship between anterior and posterior vaginal PFM strength assessments, but only moderate to good inter-rater reliability of the measurements.
- **K. Van Delft et al., (2015)** suggested that this study confirms that both digital and ultrasound assessment can be used to evaluate pelvic floor muscle contractility. Therefore, either modality of assessment can be used in isolation or as a combination in appropriate women. And the digital is more cost effective than the ultrasound.
- **Lian A et al., (2015)** concluded that the transcutaneous acupoint electrical stimulation achieves the better efficacy on FSUI (female stress urinary incontinence) as compared with the oral administration of midodrine hydrochloride tablets. This therapy effectively improves the patient's urine control ability and reduces leakage of urine.
- **Martin Slovak et al., (2015)** found that the choice of stimulation parameters, the location of the applied stimulation, the outcome measures used and the underlying conditions and symptoms studied are very diverse in the literature to date. There is little long-

term follow-up data published in the literature and hence the treatment regimen to produce on-going benefit is unclear. The current consensus is that the most promising site of stimulation is the SP6, BL33, BL35 but it is not clear which area approach to stimulus delivery is the most effective. However there is tantalizing evidence for efficacy of the transcutaneous stimulation approach, although further large placebo-controlled studies are required to provide a robust evidence base. Standardization of future trial methodology is important to allow comparisons to be made between studies and stimulation protocols.

- **Neela Soni et al., (2015)** concluded that combination of IFT and Kegel's exercises is associated with increase in strength and endurance in pelvic floor muscles. Increase in endurance translates in to better holding capacity and less or no episode of leakage. It can be concluded that Interferential Therapy with Kegel's exercise is effective for controlling SUI in the study population.

- **Shripad Hebbar et al., (2015)** stated on the basis of our findings, we believe that King's Health Questionnaire can be used for measuring the quality of life after the treatment of urinary incontinence. It is now available for use in national or international multicenter clinical trials, thus allowing scientific conclusions to be reached regarding the efficacy of such procedures.

- **Qian Mo et al., (2015)** found that acupuncture is effective for relieving the symptoms of OAB (over active bladder).
- **Zhang W et al., (2015)** suggest that the urinary incontinence belongs to external genitalia diseases, which should be treated from yin, indicating more yin-meridians be used and special acupoints be focused on.
- **Baoyan Liu et al., (2014)** determined that the PFMT (pelvic floor muscle training) is effective for the treatment of MUI. Acupuncture is a non-toxic, economical intervention with minimal adverse effects which has been shown to remain effective even for a few months after the therapy .If the efficacy of electro acupuncture is non-inferior to PFMT plus solifenacin, it may be a reasonable option in patients with MUI, requiring a conservative approach.
- **Myers DL et al., (2014)** suggested that high-quality; level 1 evidence for urinary incontinence therapy can guide clinicians in the treatment of the components of mixed urinary incontinence. Because high-quality evidence is lacking regarding the treatment of mixed urinary incontinence, treatment generally begins with conservative management emphasizing the most bothersome component. Randomized trials in women with mixed urinary incontinence populations are needed.

- **Zhui feng Guo et al., (2014)** conclude that, TENS improved urinary symptoms and quality of life and decreased adverse effects in group of patients with post stroke Urinary Incontinence. TENS can be recommended to urinary incontinence.
- **Mclean L et al., (2013)** study demonstrates that PFM training is effective in reducing urethral excursion and enhancing urethral sphincter cross-sectional area in women with SUI. Both of these effects are likely contribute to a reduction in the frequency of incontinence episodes in this population. The finding that PFM training results in hypertrophy of the urethral sphincter is novel and of particular clinical relevance as it suggests a mechanism through which PFM training may be effective in treating SUI in women who do not have intact pelvic floor muscles or in whom the pelvic floor muscles are already strong but the urethral sphincters are damaged or weak.
- **Song FJ et al., (2013)** found that the electro acupuncture has an obvious effect in urinary incontinence alleviation and bladder capacity increase, which has better efficacy than indwelling catheter therapy.
- **Sun-ho paik et al., (2013)** concluded that acupuncture may be beneficial to patients with urinary incontinence.

- **Ashish Kumar et al., (2012)** suggested that the pelvic floor exercise along with bladder training and back strengthening exercises may be major tools in stress urinary incontinence along with low back discomfort.
- **Dalia M. Kamel et al., (2012)** found that 12 weeks of specific abdominal exercises resulted in more improvement in vaginal pressure and LPP (leak point pressure) over pelvic floor exercises.
- **Lee butler et al., (2011)** Needling Zhongliao BL-33 and using electro-stimulation of Fuliu KID-7 and Rangu KID-2 should be considered as potentially valuable point prescriptions to be used in the treatment of urinary incontinence, frequent urination and over-active bladder.
- **Irwin de et al., (2011)** suggests that lower urinary tract symptoms, overactive bladder (OAB), urinary incontinence and suggestive of bladder outlet obstruction are highly prevalent conditions in worldwide. Numbers of affected individuals are projected to increase with time, with the greatest increase in burden anticipated in developing regions. There is important worldwide public-health and clinical management implications to be considered over the next decade to effectively prevent and manage these conditions.

- **Lordelo P et al., (2010)** determined that the para-sacral transcutaneous electrical nerve stimulation is effective in the treatment of children with overactive bladder.
- **Price N et al., (2010)** found that Pelvic floor muscle exercise is particularly beneficial in the treatment of urinary incontinence in females. Studies have shown up to 70% improvement in symptoms of stress incontinence following appropriately performed pelvic floor exercise.
- **Patil Shubhangi et al., (2010)** concluded that the results revealed significant improvement for all outcome measures in each group (IFT + pelvic floor exercise group and, pelvic floor exercise group). Significantly greater improvements were detected in the group which combined pelvic floor exercises with IFT. The findings of the present study indicate a potential benefit to include IFT with pelvic floor exercises when treating GSI (Genuine Stress Incontinence).
- **Simona Bartoli et al., (2010)** concluded that the multidimensionality of the consequences produced by UI and OAB increased the attention on the identification of the most affected dimension of life quality (i.e. Physical, emotional) and on the attempt of predicting life quality impairment through specific variables.

- **Hagstroem S et al., (2009)** found that the sacral transcutaneous electrical nerve stimulation seems superior to placebo for refractory daytime incontinence in children with overactive bladder.
- **S Engberg et al., (2009)** study determines that there is significant improvement in acupuncture treatment for mixed urinary incontinence in women and this pilot study support the need for additional research examining the efficacy of acupuncture in the treatment of UI in women, the feasibility of performing study procedures, and the use of a sham needle as placebo in acupuncture studies.
- **Demirtürk F et al., (2008)** suggest that physical therapy modalities (Interferential therapy and Biofeedback) used in this trial are applied easily and non-invasive. Also, when the finding that no adverse effects were observed during the study period is taken into consideration, it can be concluded that both methods can be used effectively in patients with urinary stress incontinence.
- **Hitoshi Oh-oka et al., (2008)** found that the combining IFT with daily life guidance, including water intake instructions or with behavioral therapy may bring about greater clinical effects. Furthermore, a combination of IFT, behavioral therapy, and anti-

cholinergic medication may provide a multidisciplinary approach to the treatment of "wet OAB (over active bladder)" and improvement of the condition.

- **Petra C Innerkofler et al., (2008)** concluded that in summary, for SUI patients eight weeks treatment of pelvic floor training yielded a better outcome with regard to QOL. Longer term of follow-up is planned to determine whether this difference is still present one year after treatment.
- **Rodrigo A Castro et al., (2008)** found that the pelvic floor muscle training, electrical stimulation, and vaginal cones are equally effective and better than no treatment in the management of women with urodynamic stress urinary incontinence. Also, our study supports the idea that pelvic floor muscle exercise should be offered as the first choice of treatment.
- **Janis M. Miller et al., (2007)** suggested that an effective Knack maneuver is simpler to learn than previously realized. In fact, it seems it should be common sense: if one contracts the urethral and levatorani striated muscles just before and during the moment of a stressor event, one can prevent urine loss. Unfortunately, many women have not discovered this "hidden" self-care mechanism on their own. Thus, part of the mechanism by which Kegel's exercises may be effective for stress urinary incontinence could plausibly be the increased awareness

and skill development of timing the contraction with the event that elicits leakage. The “timing” component has not been evaluated in any studies on pelvic muscle training, to these authors’ knowledge.

- **Christopher Chapple et al., (2006)** concluded that the mixed incontinence is commonly considered as the combination of ‘‘stress and urgency’’ incontinence. But this overlooks differences between current definitions of symptomatic and urodynamic mixed incontinence. It also fails to consider the wide variations in the relative importance of the stress and urgency components of mixed incontinence that different patients experience and their degree of bother. Effective history-taking and careful physical examination form the basis of differentiating between mixed and other forms of incontinence and in determining a trial of treatment, all of which can usually be carried out in a primary care setting. However, for more complex cases, coordinated patient management between community practitioners and their secondary care colleagues may be necessary.

- **Turkan et al., (2005)** states that in their examination of short-term effect of Physiotherapy in various intensities of urodynamic stress continence concluded that the combination treatment i.e. Interferential Therapy with Kegel’s exercises were more effective in mild and moderate incontinence.

- **Cammu et al., (2004)** found in their observational studies 49% recovered who were treated with Kegel's exercises, by same Physiotherapist. 51% had experienced some improvement. So Kegel's exercises benefited one half of the patients
- **Jose T. N. et al., (2004)** concluded that King's Health Questionnaire demonstrated moderate concurrent validity and strong internal consistency, mainly after treatment. It also appears to capture changes, i.e. has good responsiveness in its multifaceted domains such as the social, emotional and personal domains, and in the domains strictly related to the incontinence symptom.
- **Viktrup L et al., (2004)** concluded that the King's Health Quality of Life questionnaire is a recommended tool by European clinical practice guidelines
- **Ali Soliman Hassan et al., (2003)** found that both interferential therapy and pelvic floor exercises are effective treatment for stress urinary incontinence in women, and since no side effects have been observed, these conservative approaches are recommended before surgery is considered.
- **Sing Kai Lo et al., (2003)** suggested that IFT could potentially have an additional effect in the treatment of urinary stress and urge incontinence when prescribed together with Pelvic floor exercises.

- **Bo and Talseth et al., (2001)** found the satisfaction rate of 70% in women ; 5 years after ceasing organized Pelvic floor muscle .70% were exercising the pelvic floor muscles at least once a week, 75% showed no leakage during stress test and mean Pelvic floor muscle strength was maintained.
- **S. Meyer et al., (2001)** suggested that in their research showed that in 19 % of women, Stress urinary incontinence reduced; who performed Kegel's exercises.(p=0.002) as compared to control group (2%).
- **N.A. Soomro et al., (2001)** Conclude that group 3 (oxybutalin + transcutaneous electrical stimulation) showed significant improvement than group 1&2 (group 1 – oxybuynin&group2 – transcutaneous electrical stimulation) in objective urodynamic parameters.
- **Skeil D et al., (2001)** determined that TENS applied to the sacral dermatomes of neurological patients with urinary symptoms had a minimal effect on urodynamic data but significantly improved irritating urinary symptoms, 24-h urinary frequency, incontinence and clothes changing.
- **Vahtera T et al., (1997)** concluded that combination of interferential therapy with pelvic floor exercise is an effective treatment for urinary incontinence. The maximal contraction power and endurance of pelvic floor muscle increased after the treatment.

- **Hasan ST et al., (1996)** concluded that in patients with severe detrusor instability, conservative treatments like TENS and S3neuromodulation can be used. It produced significant changes in urodynamic parameters and presenting symptoms.
- **Nygaard IE et al., (1996)** determined that one third of all participants remained improved to the patient's satisfaction 6 months after completion of a risk-free, inexpensive, simply provided therapy. In this study the exercises were equally effective for all three urodynamic diagnoses. Inexpensive methods that could be used by primary care providers to improve the success rate of this therapy merits further attention.
- **Rekers H et al., (1992)** concluded that the prevalence and the consequences of urinary incontinence in a group of 1299 women aged 35 to 79. Incontinence was present in 344 women (26.5%), in 5.9% the incontinence occurred at least once daily. The prevalence was highest in the younger age-groups and lowest between 65 and 69 years of age, thereafter it increased again. Almost half of the incontinent women used protective sanitary towels. In contrast to this, only 13.3% considered themselves handicapped by their symptoms, and only 28.2% had ever sought medical help, although the symptoms had been present for as long as 7.5 years on average.

- **Burgio KL et al., (1991)** suggested that the continence status was significantly related to body mass index and race but not to patient age, parity, caffeine or alcohol intake, smoking, physical activity, prior gynecological surgery or several psychological variables. The results indicate that urinary incontinence is common among middle-aged women.

- **Benvenuti F et al., (1987)** showed the better improvement in their study for re-educating the Pelvic floor muscles. Out of 26 women having genuine stress urinary incontinence, seven were cured and reduced the leakage incidence who were completed the treatment of three months. Clinical effects were long-lasting in Follow-up assessments.

Materials & Methodology

3. MATERIALS AND METHODOLOGY

3.1 MATERIALS

The following materials were used in this study

- Assessment Chart
- Bladder diary
- Exercise Chart
- Equipment used- Vectrostim model (Technomed Electronics Private Ltd)
- Velcro Band and Microspore tape
- Cotton and Gel
- Covering sheet

METHODOLOGY

3.2 STUDY DESIGN

This is a single group prospective experimental study done in the pre-test post-test format.

3.3 STUDY SETTING

This study was conducted on out patients in the Department of Physiotherapy, Sri Ramakrishna Hospital, Coimbatore 641044, under supervision of staff incharge, College of Physiotherapy, SRIPMS, Coimbatore.

Informed consent was obtained from all patients and all were considered for the study after prior referral from the physician incharge.

3.4 SAMPLING

Seventeen women with mixed urinary incontinence based on the history were selected by convenient sampling.

3.5 SELECTION CRITERIA

Inclusion Criteria:

- Age group between 35-50 years.
- Women who had vaginal or caesarean delivery.
- Women who were suffering from mixed urinary incontinence for 3 months.
- Women who were willing to use modalities.
- Women who were able to complete the questionnaire in English.

Exclusion Criteria:

- Women who were using medication that enhances the urinary incontinence
- Women who were pregnant or within 8 months after delivery
- Women with advanced genital prolapse

- Women who had surgery for urogenital prolapse
- Women with psychiatric and neurological disorders
- Women with previous history of head trauma
- Women having cardiac pacemaker, metal implants
- Women with chronic cardiovascular, respiratory and renal disease
- Women with chronic degenerative disease that affects muscles and nerves
- Women with physical impairment making treatment impossible

3.6 TECHNIQUE

Initially, seventeen women with mixed urinary incontinence were selected for this study. Informed consent was obtained from all participants. Baseline assessment was taken before start of the study. Before starting the intervention two of them were withdrawn from this study due to their personal reasons. Remaining 15 participants completed the treatment. All the subjects were treated with Acu-TENS (Transcutaneous Electrical Nerve stimulation), Interferential therapy and exercises (pelvic floor, transverse abdominus and diaphragmatic breathing exercises.)

Interferential therapy was given with Vectrostim model (Technomed Electronic Private Ltd). Output intensity 0-90mA, frequency channel I 4000 Hz- 4250 Hz, channel II 4000 Hz constant, base 0-100 Hz, Spectrum 0 -150Hz. Patient was positioned in semi-fowlers position. Interferential therapy was given using quadripolar method. Two electrodes were placed on the lower abdomen just above the outer half of the inguinal ligament and another two on the inner aspect of thigh near to the origin of adductor muscle. The parameters used were, intensity up to the tolerable limit of subjects, carrier frequency of 2000Hz, vector 90^0, rhythmic sweep frequency of 10-100 Hz.

Interferential therapy (IFT) was given for15 minutes, three times in a week for 6 weeks. (Refer appendix II)

Acu- TENS was given with Vectrostim model (Technomed Electronic private Ltd). Subjects were positioned in supine lying and Acu-TENS were given on acupoints CV4, CV6, ST28, ST36, SP36, and KI 3. Then the subjects were re-positioned to prone lying and Acu-TENS were applied on BL23, BL32, BL33, and BL35. The parameters used were, intensity up to the subjective feel tickling sensation, frequency of 10Hz and pulse duration of 200µs.

The Acu-TENS was given for 30 minutes (3 minutes for each 10 acupoints) once in a week for 6 week. (Refer Appendix II)

All subjects were taught about the anatomy of the pelvic floor and lower urinary tract, physiology and continence mechanism and all were advised to do relaxed breathing, transverse abdominus and pelvic floor exercise at home. This exercise program was accompanied by instruction of the Knack and Quick-flick maneuver. Subjects were asked to maintain the bladder diary and exercise chart. (Refer Appendix II & III)

All were taught to contract the pelvic floor correctly and asked to perform 10 repetition of 2-5 seconds contraction, three times a day at home. The rest period was about 10 seconds between each contraction. The subjects were encouraged to use their preferred position initially and then progressed in all functional position. All were advised to perform equally intensive contractions. 3 or 4 fast contractions were then added.

Transverse abdominus exercise also performed in all functional position with relaxed breathing. Subjects were advised to do 10 repetitions of 5 seconds hold in all positions.

Diaphragmatic breathing exercise was performed in crook lying, sitting, and standing for 10-15 repetitions, once a day.

3.7 PARAMETER

- Quality of Life

3.8 OUTCOME MEASURE

Quality of life is measured by King's Health Quality of life Questionnaire. (KHQ)

3.9 TREATMENT DURATION

The treatment was given for 6 weeks

- Acu-TENS: Once in a week, 30 minutes for 6 weeks.
- Interferential Therapy: 3 times in a week, 15 minutes for 6 weeks.
- Exercises: 45 minutes per day, 3 times in week for 6 weeks.

3.10 STUDY DURATION

This study was carried out for the period of one year from December 2015 to December 2016.

3.11 STATISTICAL ANALYSIS

Statistical analysis was done using "Paired t-test" to find out the significant difference on the quality of life in women with mixed urinary incontinence.

The formula for the Paired t-test

Paired t-test

$$t = \frac{\bar{d}}{s}\sqrt{n}$$

$$s_d = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

Where,

d = difference between the pre-test and post-test

$\bar{d}$ = mean difference

n = total number of subjects

s = standard deviation

Data Presentation, Analysis & Interpretation

4. DATA PRESENTATION, ANALYSIS AND INTERPRETATION

DATA PRESENTATION

The pre test and post test values was obtained before and after six week of intervention respectively. Significant difference between pre test and post test value is find out by using Paired “t” test.

Table 4.1 Demographic Data

Variables	Minimum	Maximum	Mean, Standard deviation
Age	35	50	39.9±3.5
Weight (kg)	70	97	84.9±7.4
Height (cm)	153	174	162.3±7.9
Body Mass Index (BMI)	30.7	33.8	32.2±0.8

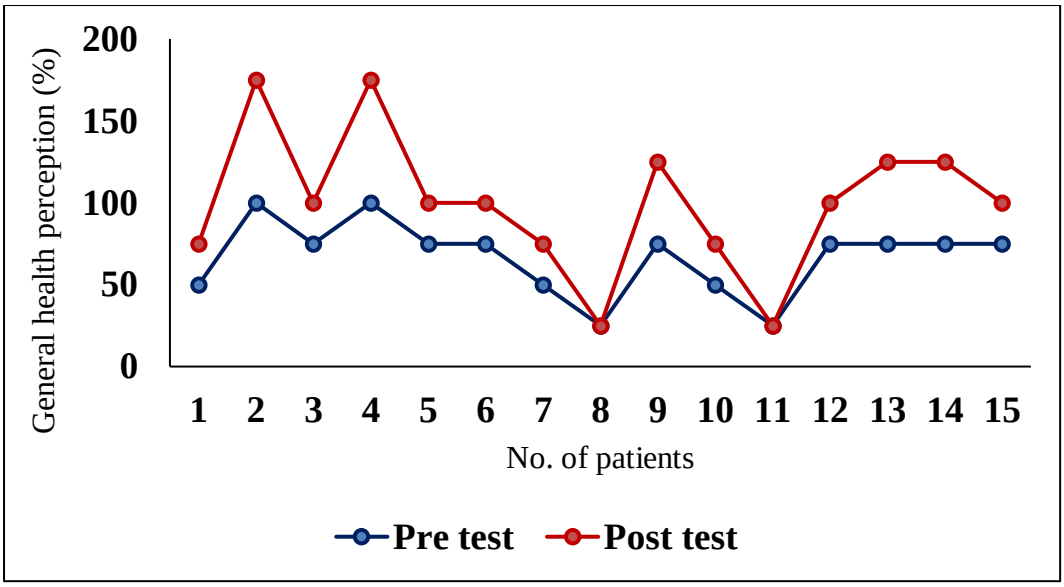

Fig. 4.1: Pre test & post test values of General health perception domain of King's Health Questionnaire (KHQ)

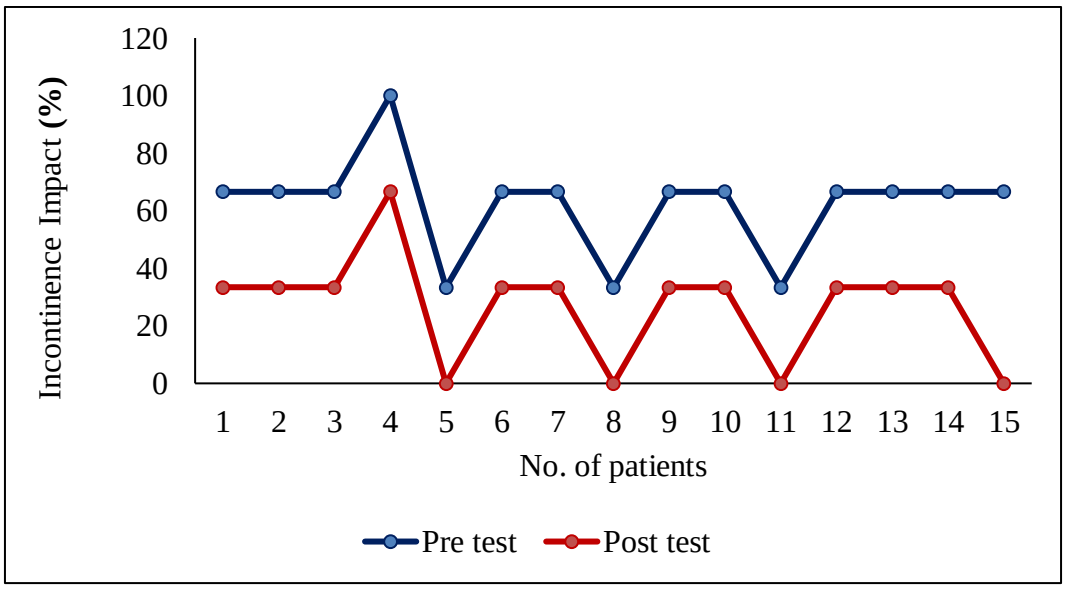

Fig. 4.2: Pre test & post test values of Incontinence impact domain of King's Health Questionnaire (KHQ)

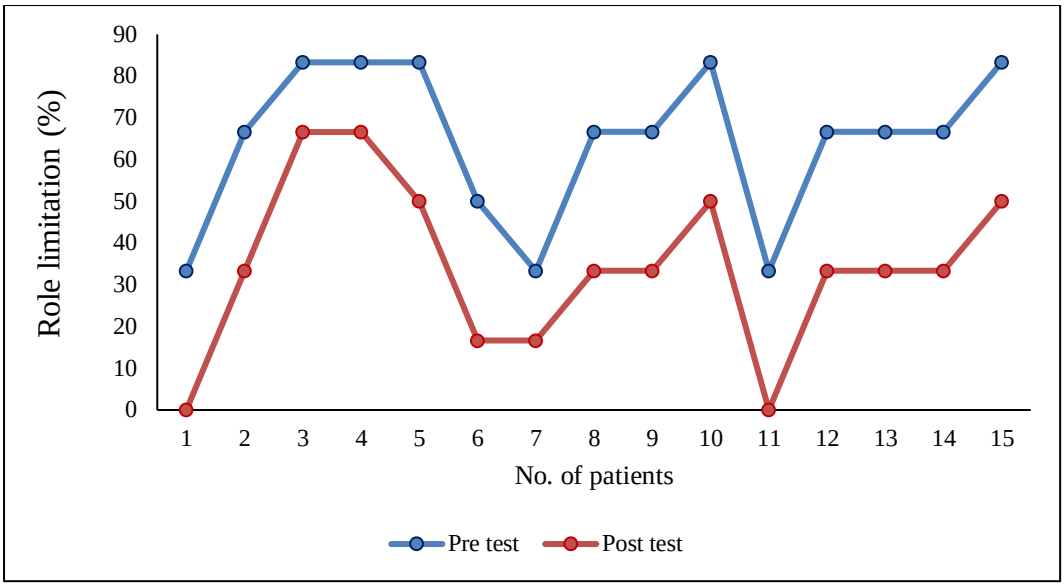

Fig. 4.3: Pre test & post test values of Role limitation domain of King's Health Questionnaire (KHQ)

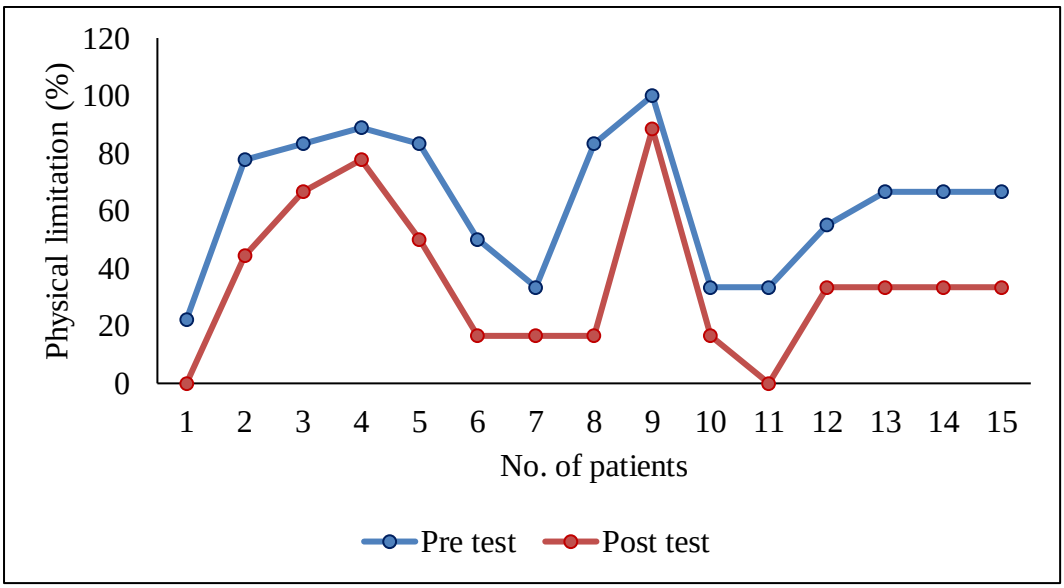

Fig. 4.4: Pre test & post test values of Physical limitation domain of King's Health Questionnaire (KHQ)

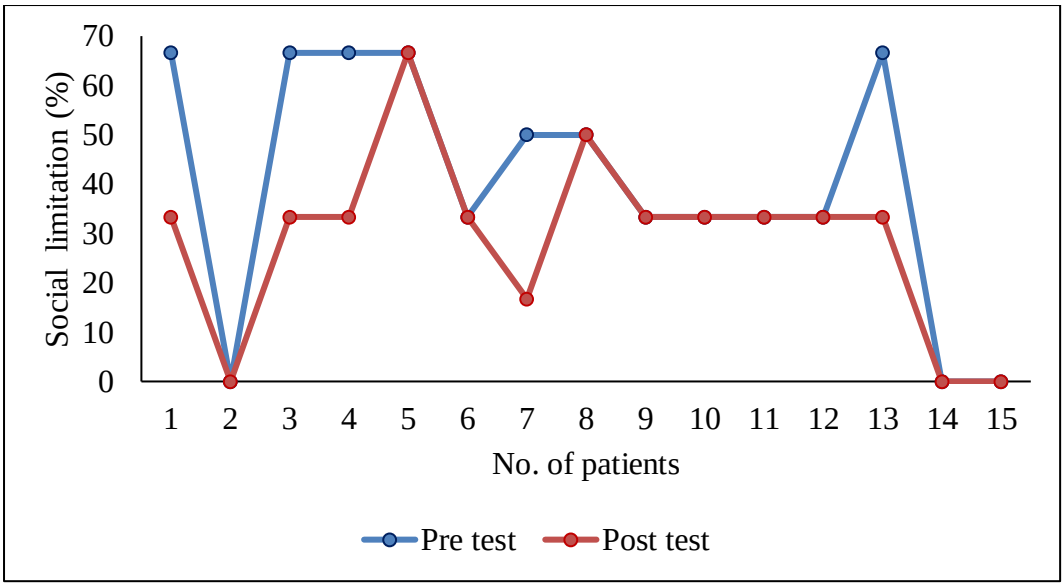

Fig. 4.5: Pre test & post test values of Social limitation domain of King's Health Questionnaire (KHQ)

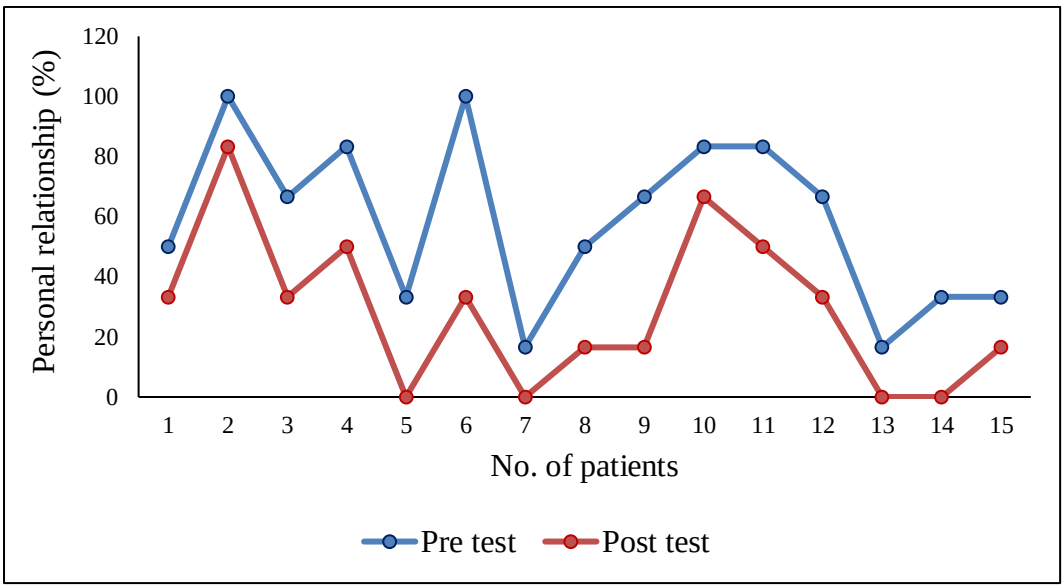

Fig. 4.6: Pre test & post test values of Personal relationship domain of King's Health Questionnaire (KHQ)

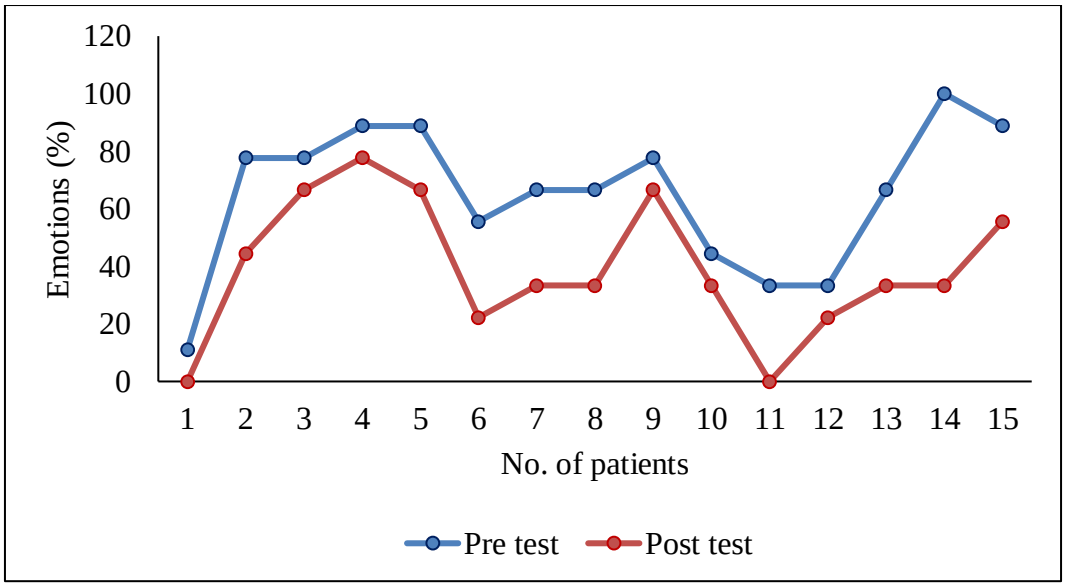

Fig. 4.7: Pre test &post test values of Emotions domain of King's Health Questionnaire (KHQ)

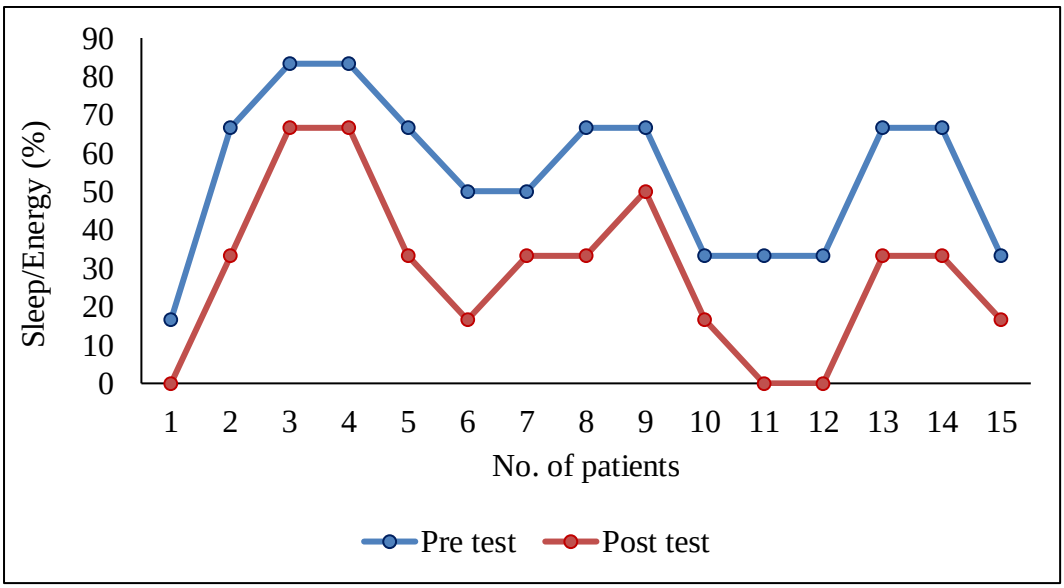

Fig. 4.8: Pre test & post test values of Sleep/energy domain of King's Health Questionnaire (KHQ)

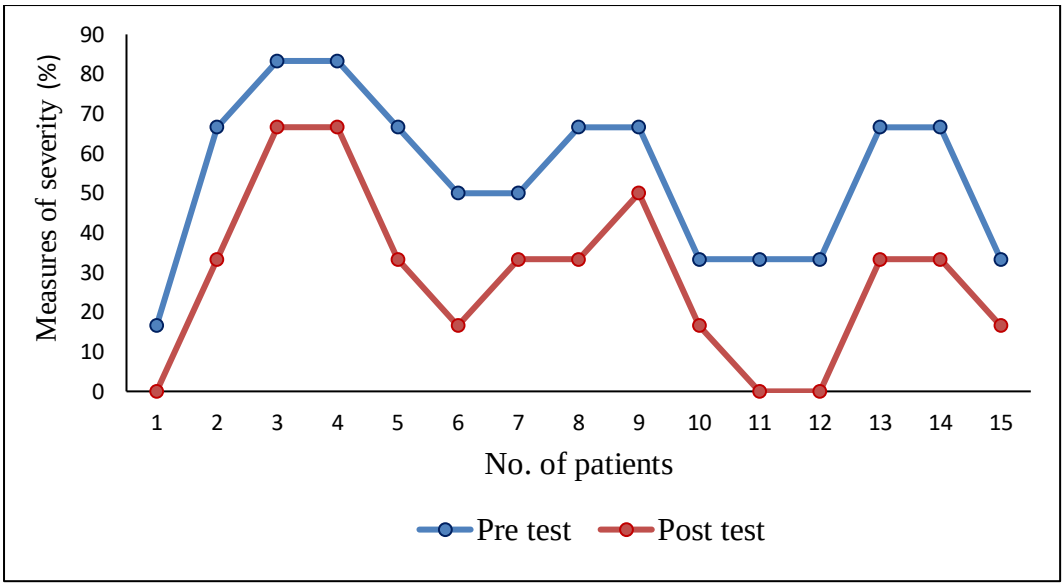

Fig. 4.9: Pre test & post test values of Measures of severity domain of King's Health Questionnaire (KHQ)

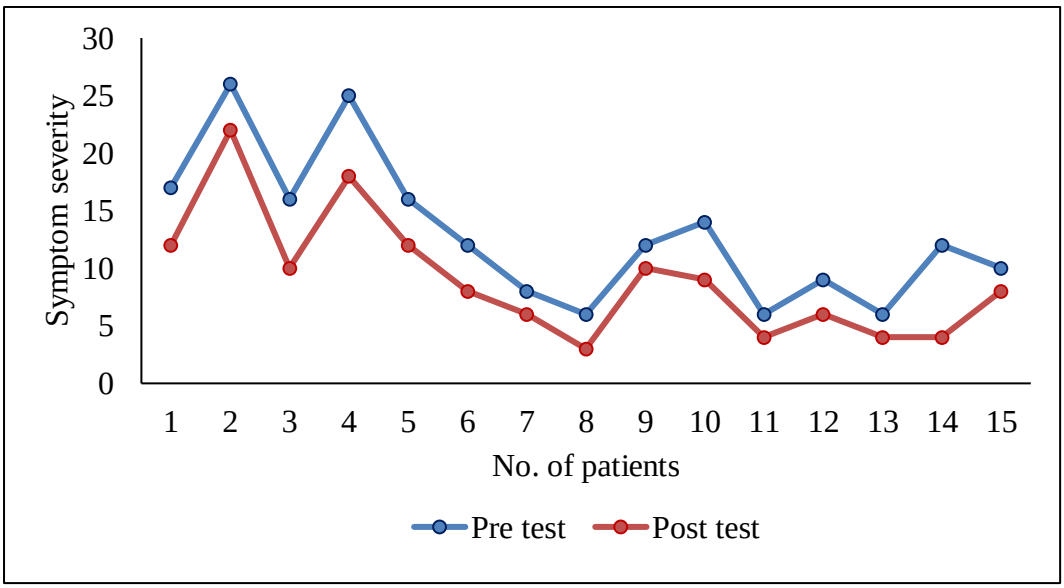

Fig. 4.10: Pre test & post test values of Symptom severity domain of King's Health Questionnaire (KHQ)

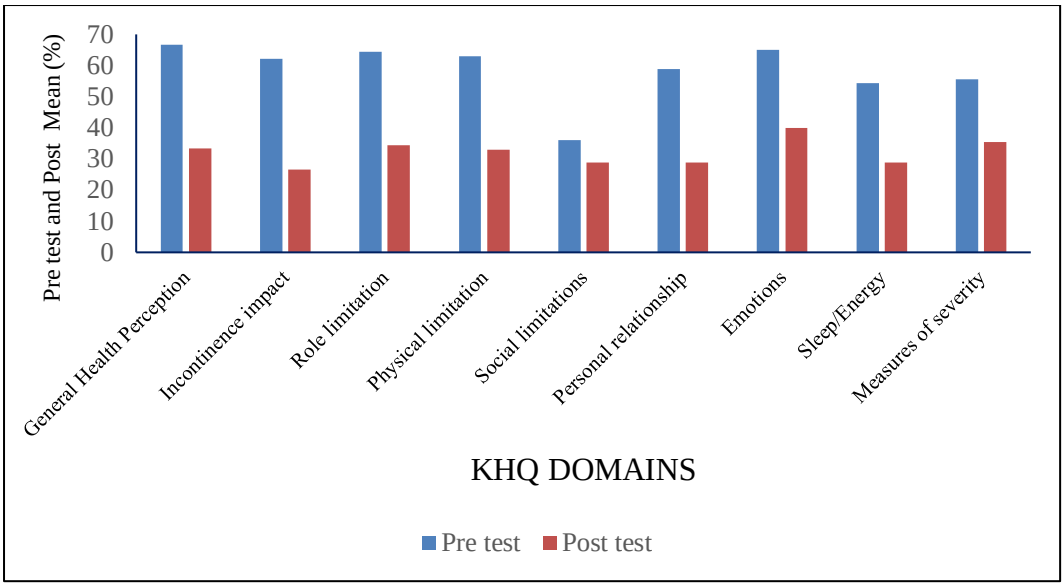

Fig. 4.11: Pre test & post test mean of King's Health Questionnaire (KHQ) domains.

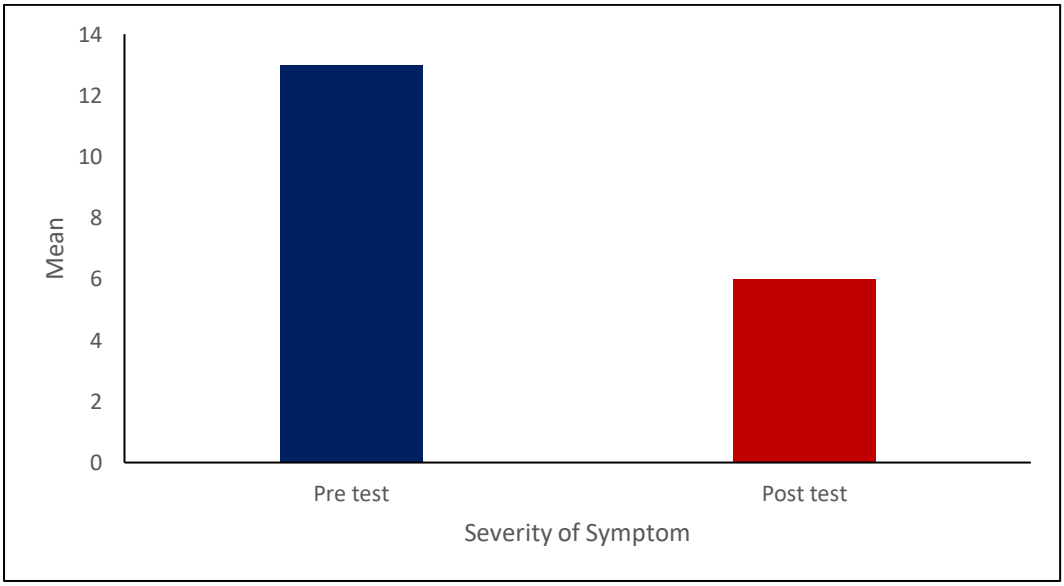

Fig. 4.12: Pre test and Post test mean of symptom severity domain of King's Health Questionnaire (KHQ)

Table 4.2: Mean, Standard deviation and 't' value for King's Health Questionnaire (KHQ) domains

King's Health Questionnaire Domains (KHQ domains)	Mean, Standard Deviation		't' value
	Pre Test	Post Test	
General Health Perception	66.66 ± 22.49	33.33 ± 22.49	10.57
Incontinence Impact	62.16 ± 17.21	26.64 ± 18.66	15.99
Role Limitation	64.4 ± 18.75	34.41 ± 20.37	16.87
Physical Limitation	62.88 ± 24	32.92 ± 25.12	4.46
Social limitation	35.96 ± 24.14	28.86 ± 18.07	6.10
Personal Relationship	58.85 ± 28.05	28.86 ± 25.56	5.59
Emotions	65.12 ± 25.14	39.96 ± 26.46	16.36
Sleep/Energy	54.4 ± 20.37	28.85 ± 21.31	12.32
Measures of severity	55.52 ±23.08	35.52 ± 24.87	6.48
Symptom Severity	13± 6.25	9.06 ± 5.80	7.82

RESULT

The mean values, standard deviation and calculated 't' value for the King's Health Questionnaire (KHQ) domains are shown in table 4.2.

The first part of the King's Health Questionnaire dealt with the perception of general health and the impact of the incontinence. The second part of the King Health Questionnaire explored the limitations (role, physical and social), personal relationship, emotions and sleep/ (role, physical and social), personal relationship, emotions and sleep/energy. Third part dealt with the perception of symptom severity. Higher the score indicates poor quality of life. Lower the score indicates the good quality of life.

At the baseline, women with mixed urinary incontinence scored higher in general health perception, incontinence impact, role limitation, physical limitation. The mean and standard deviation for these scores are 66.66±22.49, 62.16±17.21, 64.4±18.75, 62.88±24, 65.12±25.14 respectively. This indicates that women with mixed urinary incontinence are affected moderate to poorly in the above said domains.

Personal relationship, sleep/energy, measures of severity domains showed mean and standard deviation of 58.85±28.05, 54.4±20.37, 55.52±23.08 respectively. This indicates that women with mixed urinary incontinence are affected moderately in personal relationship, sleep/energy and measures of severity aspect of quality of life.

Social limitation and symptom severity scored the mean and standard deviation of 35.96±24.14, 13±6.25 respectively. This indicates the women are slightly bothered about social limitation and symptom severity since this study was conducted on women who have mixed urinary incontinence for 3 months duration.

After six weeks of treatment using Acu-TENS, Interferential therapy and exercises, women showed greater improvement in all the domains of King's Health Questionnaire. None of the women had adverse effect. The mean and standard deviation of General Health Perception, Incontinence Impact, Role Limitation, Physical Limitation, Social limitation, Personal Relationship, Emotions, Sleep/Energy, Measures of severity, Symptom Severity are 33.3±22.49, 26.64±18.66, 34.41±20.37, 32.92±25.12, 28.86±18.07, 28.86±25.56, 39.96±26.46, 28.85±21.31, 35.52±24.87, 9.06±5.80 respectively. This indicates that women improved more obviously after 6 weeks of treatment in their quality of life.

The calculated 't' value for General Health Perception, Incontinence Impact, Role Limitation, Physical Limitation, Social limitation, Personal Relationship, Emotions, Sleep/Energy, Measures of severity, Symptom Severity are 10.57, 15.99, 16.87, 4.46, 6.10,

5.59, 16.36, 12.32, 6.48, 7.82 respectively at 0.05 level of significance. The calculated ‘t’ value are greater than the table value of 2.145 at 0.05 level of significance. This clearly shows that the combination therapy using Acu-TENS, Interferential therapy and exercises significantly improved the quality of life of women with mixed urinary incontinence.

Discussion

DISCUSSION

Urinary incontinence impact several dimensions of women's life due to either the physiological limitations imposed by the disease or the psychological confrontation resulting from social and family isolation, with consequences on quality of life. It is extremely important to assess the impact and perception of quality of life in women with urinary incontinence. Several studies concluded that women with urinary incontinence often report a decrease in their quality of life (Correia et al., 2009; Lasserre et al., 2009; Bsak et al., 2013).

The King's Health Quality of Life Questionnaire (KHQ) is considered a complete questionnaire that assess both the impact of incontinence in different aspects of quality of life and the lower urinary tract symptoms perceived by the patients.

In our present study, we utilized the combination of Acu-TENS, IFT, and Exercises. Each treatment has its own role in improving the quality of life in women with mixed urinary incontinence.

Transcutaneous electrical nerve stimulation at acupoints combines the advantage of electrical stimulation and acupuncture therapy. In this study Acu-TENS is used to stimulate the specific

acupoints related to stomach, spleen, kidney, bladder and conception vessel meridians. Acupoint stimulation affects the nervous system as a whole and causes the release of neuro-chemical messenger molecules, thus results in biochemical changes that influence body's homeostatic mechanism, thus promoting physical and emotional wellbeing (David Bowsher; 1987).

Acu-TENS also brings increased blood flow to the bladder, strengthens the urinary system, controls urethral sphincter, controls the unwanted urinary incontinence symptoms through the inhibition of sensory afferent nerve of bladder, increase bladder capacity and suppresses the detrusor muscle over activity.

Electro-stimulation of the pelvic floor is widely used in the management of female urinary incontinence. The feeling of contraction of the pelvic floor is useful reminder to the pattern of the sensation that should be achieved. IFT has an advantage of more deep stimulation and less discomfort is felt by the subject while stimulating the pelvic floor muscles. Slow and fast twitch muscles are activated using the rhythmic sweep frequency.

Several reports confirmed the effect of pelvic floor exercise on female urinary incontinence. Hatin et al., (1993) found that 71% of patients were cured or improved following pelvic floor exercise. Pelvic floor muscle exercise is thought to help with deferment process by utilizing the perineo-detrusor inhibitory reflex. (Mahony et al 1977)

Spasford (2001, 2004) claimed that deep abdominal muscle contraction will make the pelvic floor muscle co-contracted and co-ordination of pelvic floor muscle contraction with deep abdominal muscle contraction is more effective than specific strength training of the pelvic floor muscle to enhance continence. Jones et al (2006) found that both continent women and women with stress urinary incontinence demonstrated co-contraction of the pelvic floor muscle during deep abdominal contractions.

The pelvic floor works in co-ordination with breathing. Holding the breath may increase intra abdominal pressure and thus cause descent stretching and weakness of the pelvic floor muscles.

The result obtained in the present study shows that women with mixed urinary incontinence perceived their overall quality of life as moderate to poor before the treatment. But, after 6 weeks of treatment

using combination therapy of Acu-TENS, IFT and exercises, women achieved significantly superior results. The result supported an overall improvement in quality of life.

Hence it clear that combined use of Acu-TENS, Interferential therapy and exercises significantly improved the quality of life in women with mixed urinary incontinence.

LIMITATIONS

- Small sample size was taken.
- Treatment was given for only 6 weeks duration.
- Urodynamic study was not included due to its high cost.

Conclusion

CONCLUSION

Based on this study, it is recommended that Acu-TENS, Interferential therapy and exercises can be used as an effective conservative management to improve quality of life in women with mixed urinary incontinence.

RECOMMENDATIONS

- This study can be done on large sample size.
- Further studies can be done with longer duration.
- In future, studies can be modified with other treatment techniques and parameters.
- Other acupressure points can be included for treating mixed urinary incontinence.
- Further research should be emphasized to find out the effects of other parameters used in Interferential therapy and Acu-TENS.

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Appendices

APPENDIX - I

DEPARTMENT OF PHYSIOTHERAPY

PHYSIOTHERAPY ASSESMENT – URINARY DYSFUNCTION

Name: **Age/sex:** **DOB:**

Hospital :No:

Address:

Tel' No: Home: **Mobile:** **Work:** **Email ID:**

Consultant name:

Last seen:

Diagnosis:

Patient's description of problem:…….

STORAGE SYMPTOMS	FREQUENCY OF LEAKAGE
Stress leakage	Never
Urgency	About 1 per 3 week or less
Urge incontinence	2-3 per week
Frequency	About once a day
Nocturia	More than one per day
Nocturanal eneuresis	Others

VOIDING SYMPTOMS **SEVERITY OF LEAKAGE**

Hesitancy **None**

Slow stream **A little amount**

Intermittent stream **A moderate amount**

Feeling of incomplete emptying **A large amount**

Other symptoms e.g pain, feeling of something coming down…

……

HISTORY OF PRESENT CONDITION

Onset date

Triggers for leakage

Type of pads

No.of pads used per ay

Cystitis?

INVESTIGATIONS

e.g Urodynamics ……

……

GYNEC.HISTORY **FREQUENCY/ VOL**

Menstruation cycle **Frequency day/ night**

Menopause/yr **Average voided vol.per 24 hrs**

Sexually active **Max.voided.vol**

Dyspareunia **Min.voided.vol**

Surgery **Average.vol.drunk in 24 hrs**

Other **Average leaks per 24 hrs**

(Appendix III- bladder diary)

OBSTETRIC HISTORY

Parity

Year Type delivery weight 1st2nd 3rd

	Year	Type of delivery	Weight	1	2	3	Tear/Episiotomy
1							
2							
3							
4							

Medical History

Other condition (e.g. back pain problems, allergies, fever, asthma, chronic cough, diabetes, hypertension, depression) ……..……
……

Obesity

Smoking

Bowels – B/O per week……

Leakage wind/fluids/solid……

SURGICAL HISTORY

-
-
-
-

CURRENT MEDICATION

……
……

ON PALPATION

- Any adhesion
- Swelling

ON OBSERVATION

- Built
- Perineal Trauma/scar
- Effect of cough.

ON EXAMINATION

Vital signs: BP: Pulse Rate: Heart Rate : Temperature:

Height : Weight : BMI :

Pelvic Floor Muscle

Contraction – aware/ not aware

- Hold time
- Repetitions
- Fast repetitions
- Reflex to cough
- Co- contraction with transverse abdominals

QoL- Kings Health Quality Of Life questionnaire

Part I Score

- General Health perception -
- Incontinence impact -
-

Part II

- Role limitation -
- Physical limitation -
- Social limitation -
- Personal relationship -
- Emotions -
- Sleep/Energy -
- Measures of severity -

Part III

- Symptoms of severity –

Treatment

Follow up

Patient's priorities for improvement and comments

……..

……..

Signature:
Date:

KING'S HEALTH QUESTIONNAIRE (KHQ)

The KHQ was developed and validated by Kelleher et al in 1997 in the UK. KHQ is a valid and reliable instrument for the assessment of quality of life in women with urinary incontinence. They also opined that KHQ will be useful for the rapid appraisal and follow-up in many clinical trials involving new treatments for urinary incontinence. KHQ is a patient self-administered self-report and has 3 parts consisting of 21 items. Part 1 contains general health perception and incontinence impact (one item each). Part 2 contains role limitations, physical limitations, social limitations (two items each), personal relationships, emotions (three items each) and sleep/energy (two items), measures of severity (four items). Part 3 is considered as a single item and contains ten responses in relation to frequency, nocturia, urgency, urge, stress, intercourse incontinence, nocturnal enuresis, infections, pain, and difficulty in voiding. The responses in KHQ have four point rating system. The eight subscales ("domains") scored between 0 (best) and 100 (worst). The Symptom Severity scale is scored from 0 (best) to 30 (worst). Decreases in KHQ domain scores indicate an improvement in quality of life. The minimally important difference - the smallest change in score that subjects perceive as beneficial is 3 points for the symptom severity scale and 5 points for all other KHQ domains. It is interesting to note that lower scores indicate patient wellbeing and higher scores mean that the person is severely affected by the disease condition.

BRITISH SOCIETY OF UROGYNAECOLOGY

King's Health Questionnaires (KHQ)

Q1. GENERAL HEALTH PERCEPTION: How would you describe your health at present?	○ Very good	○ Good	○ Fair	○ Poor	○ Very poor
Q2. INCONTINENCE IMPACT: How much do you think your bladder problem affects your life?	○ Not at all	○ A little	○ Moderately	○ A lot	
Q3. ROLE LIMITATIONS: Does your bladder problem affect					
A. your house hold tasks e.g. cleaning, shopping etc?	○ Not at all	○ A little	○ Moderately	○ A lot	
B. your job or normal daily activities outside the home?	○ Not at all	○ A little	○ Moderately	○ A lot	
Q4. PHYSICAL LIMITATIONS: Does your bladder problem affect					
A. your physical activities (e.g., going for walk, run, sports, gym, etc.)?	○ Not at all	○ A little	○ Moderately	○ A lot	
B. your affect travel?	○ Not at all	○ A little	○ Moderately	○ A lot	
Q5. SOCIAL LIMITATIONS: Does your bladder problem limit					
A. your social life	○ Not at all	○ A little	○ Moderately	○ A lot	
B. your limit your ability to see / visit friends?	○ Not at all	○ A little	○ Moderately	○ A lot	
Q6. PERSONAL RELATIONSHIPS: Does your bladder problem affect					
A. your relationship with your partner?	○ Not at all	○ A little	○ Moderately	○ A lot	○ Not applicable
B. your sex life?	○ Not at all	○ A little	○ Moderately	○ A lot	○ Not applicable
C. your family life?	○ Not at all	○ A little	○ Moderately	○ A lot	○ Not applicable
Q7. EMOTIONS: Does your bladder problem make					
A. you feel depressed?	○ Not at all	○ A little	○ Moderately	○ Very much	
B. you feel anxious and nervous?	○ Not at all	○ A little	○ Moderately	○ Very much	
C. you feel bad about yourself?	○ Not at all	○ A little	○ Moderately	○ Very much	
Q8. SLEEP / ENERGY : Does your bladder problem					
A. afect your sleep?	○ Not at all	○ A little	○ Moderately	○ A lot	
B. make you feel worn out and tired?	○ Not at all	○ A little	○ Moderately	○ A lot	
Q9. SEVERITY MEASURES:					
A: Wear pads to keep dry?	○ Never	○ Sometimes	○ Often	○ All the time	
B: Be careful how much fluid you drink?	○ Never	○ Sometimes	○ Often	○ All the time	
C: Change your underclothes because they get wet	○ Never	○ Sometimes	○ Often	○ All the time	
D: Worry in case you smell	○ Never	○ Sometimes	○ Often	○ All the time	
Q10. SYMPTOM SEVERITY SCALE					
A. Frequency of urination	○ None	○ Mild	○ Moderate	○ Severe	
B. Nocturia	○ None	○ Mild	○ Moderate	○ Severe	
C. Urgency	○ None	○ Mild	○ Moderate	○ Severe	
D. Urge Incontinence	○ None	○ Mild	○ Moderate	○ Severe	
E. Stress Incontinence	○ None	○ Mild	○ Moderate	○ Severe	
F. Nocturnal Enuresis	○ None	○ Mild	○ Moderate	○ Severe	
G. Intercourse Incontinence	○ None	○ Mild	○ Moderate	○ Severe	
H. Waterworks infection	○ None	○ Mild	○ Moderate	○ Severe	
I. Bladder pain	○ None	○ Mild	○ Moderate	○ Severe	
J. Postvoid dribble	○ None	○ Mild	○ Moderate	○ Severe	

Calculation of Scores

Q1. Very good=1, Good=2, Fair=3, Poor=4, Very poor=5	Q1 Overall Score= ((Actual Score – 1) / 4) x 100
Q2. Not at all=1, A little=2, Moderately=3, A lot=4	Q2 Overall Score= ((Actual Score – 1) / 3) x 100
Q3. Not at all=1, A little=2, Moderately=3, A lot=4	Q3 Overall Score= ((Actual Total Score – 2) / 6) x 100
Q4. Not at all=1, A little=2, Moderately=3, A lot=4	Q4 Overall Score= ((Actual Total Score – 2) / 6) x 100
Q5. Not at all=1, A little=2, Moderately=3, A lot=4	Q5 Overall Score depends upon Q6C Score
If Q6 C response is "Not Applicable"	Q5 Overall Score= ((Actual Total Score – 2) / 6) x 100
If Q6 C response is other than "Not Applicable"	Q5 Overall Score= (Sum of scores to 5A, 5B, 6C)-3 /9 X 100
O6. Not at all=1, A little=2, Moderately=3, A lot=4, Not applicable=0	
If (6A+6B) ≥ 2	Q6 Overall score is (Sum of scores to 6A, 6B)-2 /6 X 100
If (6A+6B) =1	Q6 Overall score is (Sum of scores to 6A, 6B)-1 /3 X 100
If (6A+6B) =0	Q6 Score should be treated as missing value
Q7. Not at all=1, A little=2, Moderately=3, Very much=4	Q7 Overall Score= (Sum of scores to 7A, 7B, 7C)-3 /9 X 100
Q8. Not at all=1, A little=2, Moderately=3, A lot=4	Q8 Overall Score= ((Actual Total Score – 2) / 6) x 100
Q9. Never=1, Sometimes=2, Often=3, All the time=4	Q9 Overall Score: (Actual Total Score -4) / 12 X 100
Q10. None=0, Mild=1, Moderate=2, Severe=3 (for Responses A to J)	Q10 Overall Score is the total of responses to ten questions.

PART 1 SCORE = (Q1. OVERALL SCORE) + (Q2. OVERALL SCORE)
PART 2 SCORE = OVERALL SCORE OF Q3 to Q9
PART 3 SCORE = OVERALL SCORE OF Q10

APPENDIX – II

ACU-TENS

Acu-TENS is a non-invasive treatment technique, used in the mixed urinary incontinence. Acupoints are well defined specific points on the body which traditional Chinese medicine (TCM) asserts, it can be stimulated to treat the disease. There is also specific acupoints related to the Urinary system. When stimulating these points, the entire nervous system stimulated as whole and brings increased blood flow to the bladder and strengthens the urinary system. Each acupoints related to the bladder has particular effects on urinary system.

Acu-points:

- Conception vessel point

  CV 4, CV 6

- Bladder meridian/ bladder channel point

  BL 23, BL 32, BL 33, BL 35

- Stomach meridian

  ST 28, ST 36

- Spleen meridian

  SP 36

- Kidney meridian

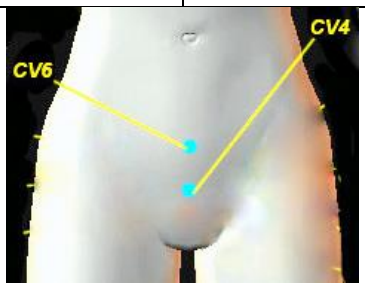
  KL 3

Parameters:

- Frequency – 20 Hz
- Intensity – Up to the subjective feel tickling sensation
- Pulse duration – 200 µs
- Duration – 30 minutes
- Subject position
  - Supine position for acupoints – CV4, CV6, ST28, ST36, SP36, KI 3
  - Prone position for acupoints – BL23, BL32, BL33, BL35

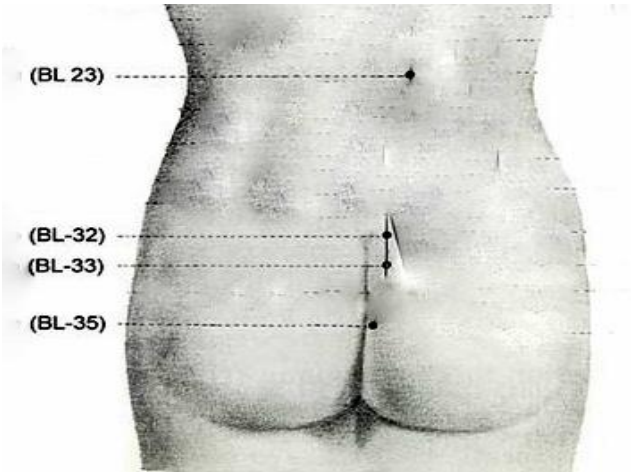
CONCEPTION VESSEL

➢ CV4 ▪ Location – On the midline of the abdomen, 3/5th of the way down from the umbilicus to the superior edge of the pubic bone. ▪ Indication – frequent urination, retention of urine, dark urine, painful micturation, heamaturia	➢ CV6 ▪ Location – located two finger width below the entire umbilicus ▪ Indication – frequent urination



BLADDER MERIDIAN

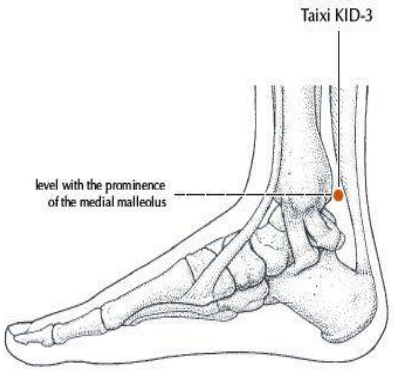
➢ BL23 ▪ Location – 1.5 cun (5cm) lateral to the intra vertebral space between L2,L3, usually at the highest point of para-spinal muscles ▪ Indication - cloudy urine, nocturnal eneuresis, urinary incontinence, heamaturia	➢ BL 32 ▪ Location – In the second posterior sacral foramen ▪ Indication – painful micturation, difficult urination
➢ BL33 ▪ Location - In the third posterior sacral foramen. ▪ Indication – decreased amount of urine, frequent urination	➢ BL35 ▪ Location – 0.5 cun (1.5com) lateral to the either side of the tip of the coccyx ▪ Indication – frequent urination, urinary urgency



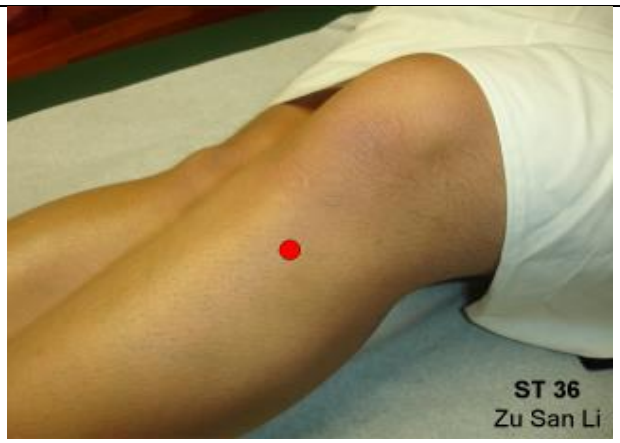
SPLEEN MERIDIAN

➢ **SP6** ▪ Location - On the medial aspect of lower leg, 3cun (10cm) above the medial malleolus, on the posterior border of the medial aspects of tibia. ▪ Indication –urgency in urination, cloudy urine	

KIDNEY MERIDIAN

➢ **KI 3** ▪ Location - On the medial aspect of the foot, posterior to the medial malleolus, in the depression between the tip of the medial malleolus and tendo calcaneus. ▪ Indication - frequent need to urinate, Cough, diabetes	

STOMACH MERIDIAN

➢ ST28 ▪ Location – On the lower abdomen, 3cun (10cm) below the center of the umbilicus, 2cun (7cm) lateral to the anterior median line ▪ Indication – frequent urination, urgency in urination	
➢ ST 36 (stomach meridian) ▪ Location – located 4 finger width down from the bottom of the patella along the anterior crest of the tibia ▪ Indication – abdominal swelling due to urinary retention	

INTERFERENTIAL THERAPY

Interferential current (IC) as one of the medium frequency currents, is commonly used in the treatment of UI. IC can be applied with two or four electrodes and effective low frequency occurs in that area where the medium frequencies intersect, the beat frequency is produced by this intersection. This beat frequency helps in deep tissue stimulation of pelvic floor muscle. Ease of usage and external application without giving harm to the superficial tissues are the main advantages of this method. The current produces positive responses in the body and the intensity is well tolerated by the patients.

Protocol:

- Technique – vector 90^0
- Frequency – 2000 Hz
- Intensity – Depends on subject's tolerance level.
- Duration – 15 minutes
- Electrode placement – Quadripolar method
    - Two electrode over the lower abdomen just above the outer half of inguinal ligament
    - Two electrodes on upper part of inner thigh near to the origin of adductor muscles

EXERCISE PROGRAM

The pelvic floor muscle consist of approximately 70% of slow-twitch (type 1), 30% of fast-twitch (type 2) muscle fibers. The pelvic floor consists of a group of 12 striated muscles arranged in 3 layers. The voluntary function of the pelvic floor muscle group is a mass contraction, best described as an inward lift and squeeze around the urethra, vagina and rectum .The function of the pelvic floor muscles is to lend structural support to the pelvic structures, the urethra, vagina and rectum. Pelvic floor muscle training involves the repetitive contraction of the pelvic floor muscle, which builds strength and perineal support, and improves muscle tone.

This exercise programs not only focus on the pelvic floor muscles exercise but also the abdominal muscle because there is an increasing body of evidence suggests that active contraction of the transverse abdominal muscle is associated with co-activation of the pelvic floor muscle.

PELVIC FLOOR EXERCISE

Lie on your back with legs out straight. Keep your stomach, buttocksand thigh muscles relaxed during the entire exercise. Breathe slowly. Notice your stomach rises when you inhale or take a breath in, and your stomach falls as you exhale or breathe out. Squeeze the pelvic muscles tight and hold the contraction for 5 seconds. Then relax for 10 seconds before starting the next contraction. Repeat this sequence of squeezing for 2-5 seconds and resting for 10 seconds for 10 repetitions.

Progression of pelvic floor exercise:

- 10 repetition of 5 second contraction with 5 second relaxation time.
- 20 repetition of 2 second contraction with 2 second relaxation time.
- 20 repetition of 1 second contraction with 1 second relaxation time.
- 5 repetition of 10 second contraction with 10 second relaxation time followed by 5 repetition of strong contraction and stimulated cough with 1 minute interval.

The recommended posture to be adopted during the prescribed exercise regimen also varies and includes sitting, kneeling, standing, and standing with legs astride. The recommended duration of the prescribed regimen varies widely, from 10 minutes to 20 minutes.

- **KNACK MANEUVER**

The ‘The Knack’ is a strong and well timed voluntary contraction of the pelvic floor muscles performed in response to a specific situation. It involves the pelvic floor muscles contracting immediately before and during any increase in downward pressure on the pelvic floor like coughing, Sneezing, Lifting, Blowing your nose, Rising into standing from sitting, Stepping down heavily.

Procedure:

Sit away from the back of the chair or stand tall with your chest lifted and the normal inward curve in your low back. Lift and squeeze the muscles in and around all three pelvic openings (urethra, vagina and anus) immediately before you cough, sneeze or lift. Contract around all three pelvic openings at once, with a strong inward lift and squeeze of your pelvic floor muscles. Maintain this pelvic floor muscle contraction as you do a small cough. After you cough, relax your pelvic floor muscles back to normal resting level. Progress this exercise with more forceful cough, or repeating a couple of coughs in a row maintaining your pelvic floor contraction throughout as you do so.

- **QUICK-FLICK MANEUVER**

Quick-Flick rapid motion of the pelvic floor it helps to fine-tune your pelvic floor muscular control. Quick-Flicks is a great exercise for bladder control and doing 3 Quick-Flicks can help temporarily stop the urgent feeling to urinate.

Procedure:

Squeeze and lift your pelvic floor muscles as strongly and asquickly as possible. Do not try to hold on to the contraction, justsqueeze and let go. Rest for a few seconds in between eachsqueeze. Repeat this 10 to 20 times or until you feel your pelvicfloor muscles fatigue. If you can, do this exercise one to three times per day.

Points to be considered:

- feel your pelvic floor muscles 'lift up' inside, rather than a downward movement
- relax your thighs and buttocks
- keep breathing normally
- Stop exercising if your muscles fatigue

ABDOMINAL EXERCISE

- **Transverse Abdominals Contraction**

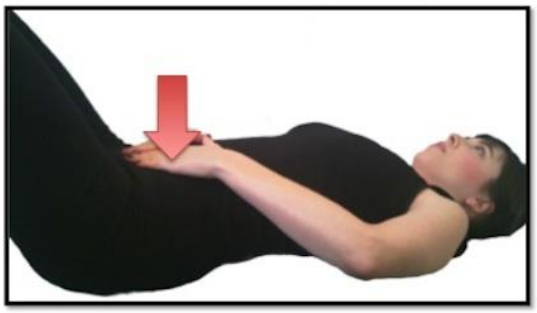
Lie on your back with your knees bent so your feet are flat on the mat. Breathe slowly. As you exhale, pull your belly button up and in and hold it for 5 seconds. Then inhale and relax your stomach muscles. Repeat it for10 times. Modify this exercise by doing transverse abdominus contraction together with pelvic floor contraction.

The recommended posture to be adopted during the prescribed exercise regimen also varies and includes sitting, quadripod and standing.

DIAPHRAGMATIC BREATHING EXERCISE

Lie on relaxed pose (crook lying, sitting, standing), place your hand over lower abdomen, as you start to inhale through nose, let your abdomen expands outward and exhale through mouth, while your abdomen draws in. It can be performed in relaxed manner for 10- 15 breaths

Inhale and expand in the belly



Exhale and hollow out the belly

HOME ADVICE

- Drink moderate volume of fluids
- Avoid caffeine and carbonated drinks
- Empty your bladder before going to sleep
- Always try to empty your bladder completely
- Empty your bladder before and after intercourse
- Do schedule bathroom visits rather than visit for urgency
- Delay urination by using pelvic floor technique
- Use knack and quick-flick maneuver if needed, depend on situation.
- Do exercise once daily at least three days in a week

CONSENT FORM

I, _____hereby given consent to participate as a subject in the following research study which is being conducted at the Department of Physiotherapy, Sri Ramakrishna Hospital, Coimbatore-641044

Project title:

"**Effectiveness of Acu-TENS, Interferential therapy and exercises on the quality of life in women with mixed urinary incontinence**"**-An experimental study**

I understand that the study involves the assessment of my quality of life at the start and the completion of intervention protocol.

I acknowledge that:

I have received an adequate explanation of the possible risks and inconveniences that may arise from participation in this study.

I have received a copy of and read fully the written information concerning the study, and any questions have been answered to my satisfaction.

I understand that all the information I provide will be identified by code only.

I understand that the information I provide will be kept on secured premises and will be available to the study investigator only except at my request or on my authorization.

I understand that I am free to withdraw my consent at any time during the study and that the information which has been collected will not be used in this case.

Name of Participant [Block letters]:_____

Signature:_____Date:_____

APPENDIX III

BLADDER DIARY

This diary will help you and your health care team to figure out the causes of your bladder control trouble. The "sample" line shows you how to use the diary.

Your name:_____ Date:_____

Time	Drinks		Trips to the Bathroom		Accidental Leaks	Did you feel a strong urge to go?	What were you doing at the time?
	What kind?	*How much?*	*How many times?*	*How much urine? (circle one)*	*How much? (circle one)*	*Circle one*	*Sneezing, exercising having sex, lifting, etc.*
Sample	Coffee	2 cups	✓✓	(sm) med lg	sm (med) lg	Yes (No)	Running
6–7 a.m.				sm med lg	sm med lg	Yes No	
7–8 a.m.				sm med lg	sm med lg	Yes No	
8–9 a.m.				sm med lg	sm med lg	Yes No	
9–10 a.m.				sm med lg	sm med lg	Yes No	
10–11 a.m.				sm med lg	sm med lg	Yes No	
11–12 noon				sm med lg	sm med lg	Yes No	
12–1 p.m.				sm med lg	sm med lg	Yes No	
1–2 p.m.				sm med lg	sm med lg	Yes No	
2–3 p.m.				sm med lg	sm med lg	Yes No	
3–4 p.m.				sm med lg	sm med lg	Yes No	
4–5 p.m				sm med lg	sm med lg	Yes No	
5–6 p.m.				sm med lg	sm med lg	Yes No	
6–7 p.m.				sm med lg	sm med lg	Yes No	

Use this sheet as a master for making copies that you can use as a bladder diary for as many days as you need.

Time	Drinks		Trips to the Bathroom		Accidental Leaks	Did you feel a strong urge to go?	What were you doing at the time?
	What kind?	*How much?*	*How many times?*	*How much urine? (circle one)*	*How much? (circle one)*	*Circle one*	*Sneezing, exercising having sex, lifting, etc.*
Sample	Soda	2 cans	✓✓	(sm) med lg	(sm) med lg	Yes (No)	Running
7–8 p.m.				sm med lg	sm med lg	Yes No	
8–9 p.m.				sm med lg	sm med lg	Yes No	
9–10 p.m.				sm med lg	sm med lg	Yes No	
10–11 p.m.				sm med lg	sm med lg	Yes No	
11–12 midnight				sm med lg	sm med lg	Yes No	
12–1 a.m.				sm med lg	sm med lg	Yes No	
1–2 a.m.				sm med lg	sm med lg	Yes No	
2–3 a.m.				sm med lg	sm med lg	Yes No	
3–4 a.m.				sm med lg	sm med lg	Yes No	
4–5 a.m.				sm med lg	sm med lg	Yes No	
5–6 a.m.				sm med lg	sm med lg	Yes No	

I used _____ pads today. I used _____ diapers today (write number)

Questions to ask my health care team: -

_____

_____

EXERCISE CHART

S.No.	Exercises				1 Week	II Week	III Week	IV Week	V Week	VI Week
	Name of exercise regimen	Hold / Contraction Time	Relaxation Time	Number of Repetition						
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										